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(71)出願人 000006633

京セラ株式会社

京都府京都市伏見区竹田鳥羽殿町6番地

(72)発明者 藤原 正

鹿児島県川内市高城町1810番地 京セラ株式会社鹿児島川内工場内

(72)発明者 桐木平 勇

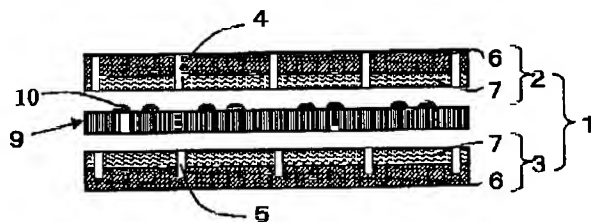
鹿児島県国分市山下町1番1号 京セラ株式会社鹿児島国分工場内

(54)【発明の名称】 多数個取り配線基板切断用押え治具およびこれを用いた配線基板の製造方法

(57)【要約】

【課題】 多数個取り配線基板を切断する際に表面の導体バンプの変形を防止して、導体バンプと電子部品の各電極との接合を確実する。また、繰返し使用可能な多数個取り配線基板切断用押え治具を提供する。

【解決手段】 主面上に導体バンプ10を有する多数の配線基板領域8を配列して成る多数個取り配線基板9を両主面から挟む樹脂板から成る第1治具2と第2治具3とから成り、第1治具2は配線基板領域8を個々に切断するための切断刃を誘導するスリット4を有するとともに第2治具3はスリット4に対向する位置に溝5を有する多数個取り配線基板切断用押え治具1であって、導体バンプ10と対向する第1または第2治具2・3は、その対向面に硬度がJ I S-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材7を有する。



【特許請求の範囲】

【請求項1】 主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を両主面から挟む樹脂板から成る第1治具と第2治具とから成り、前記第1治具は前記配線基板領域を個々に切断するための切断刃を誘導するスリットを有するとともに前記第2治具は前記スリットに対向する位置に溝を有する多数個取り配線基板切断用押え治具であって、前記導体バンプと対向する前記第1または第2治具は、その対向面に硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材を有することを特徴とする多数個取り配線基板切断用押え治具。

【請求項2】 前記多数個取り配線基板切断用押え治具は、前記導体バンプとの対向面に厚みが0.2～2.0mmである緩衝材を有することを特徴とする請求項1に記載の多数個取り配線基板切断用押え治具。

【請求項3】 前記多数個取り配線基板切断用押え治具は、前記導体バンプとの対向しない面にも硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材を有することを特徴とする請求項1または請求項2記載の多数個取り配線基板切断用押え治具。

【請求項4】 主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を用意する工程と、前記多数の配線基板領域を個々に切断するための切断刃を誘導するスリットを有する第1治具または前記スリットに対向する位置に溝を有する第2治具において、前記導体バンプとの対向面に硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材を介在させて、前記多数個取り配線基板を第1治具および第2治具で挟み固定する工程と、前記多数の配線基板領域を個々の配線基板に切断する工程とを順次行うことを特徴とする配線基板の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、多数の配線基板領域を個々に切断するための切断刃を誘導するスリットを有する第1治具と、スリットに対向する位置に溝を有する第2治具とを有する多数個取り配線基板切断用押え治具およびこれを用いた配線基板の製造方法に関する。

【0002】

【従来の技術】近年、半導体素子や抵抗器等の電子部品を搭載するために用いられる配線基板には、ガラス基材および熱硬化性樹脂から成る絶縁板と銅箔等から成る配線導体層とを交互に複数積層して成るプリント基板や、絶縁板上に熱硬化性樹脂およびフィラーから成る絶縁層と銅めっき層から成る配線導体層とを複数積層して成るビルドアップ基板等の樹脂製の基板が用いられてきている。また、このような配線基板は、配線基板となる領域を複数配列した多数個取り配線基板を用い、この多数個取り配線基板上に絶縁板と配線導体層、あるいは絶縁層

と配線導体層とを交互に積層し、しかる後、多数個取り配線基板を切断して個片にすることにより形成されている。さらに、配線基板表面には、半導体素子等の電子部品の電極を接続するための導体バンプが形成されている。導体バンプは、通常、個片とした配線基板の表面に半田ペーストを印刷した後、配線基板をリフロー炉に通して半田ペーストを加熱溶融することにより略半球状に形成される。なお、導体バンプの高さは、通常、10～100μm程度となっている。

【0003】しかしながら、従来の方法によると、多数個取り配線基板を切断して個片にした後に配線基板毎に半田ペーストを印刷し、さらに配線基板をリフロー炉に通すことにより導体バンプを形成することから、時間と手間がかかり効率が悪いという問題点を有していた。このような問題点を改善するために、多数個取り配線基板を切断する前に各配線基板領域に半田ペーストを印刷するとともにこれをリフロー炉に通して導体バンプを形成し、しかる後、多数個取り配線基板を個片に切断して配線基板を得る方法が採用されるようになってきている。

【0004】なお、多数個取り配線基板の切断は、フェノール樹脂等の樹脂板から成る切断用押え治具を用いて多数個取り配線基板を上下から挟みこみ固定し、しかる後、ダイシングやルータ等の切断機を用いて行なわれている。また、切断用押え治具の一方の治具は切断刃を誘導するスリットを有し、他方の治具はスリットに対向する位置に溝を有している。

【0005】

【発明が解決しようとする課題】しかしながら、このような切断用押え治具は、配線基板の表面に形成された導体バンプが軟らかいために、多数個取り配線基板を上下から挟みこみ固定して切断する際に導体バンプを変形させてその高さを低くしてしまうという問題点を有していた。その結果、配線基板の配線導体層と電子部品の各電極とを導体バンプを介して実装する際に両者が確実に接合できないという問題点を有していた。

【0006】また、切断用押え治具は、強く押え過ぎると使用後にその表面に導体バンプの跡が残る凹凸が形成されてしまい、繰返して使用した際に多数個取り配線基板をしっかりと固定できなくなってしまうという問題点を有していた。

【0007】さらに、樹脂板が硬いことから、多数個取り配線基板の切断時に、樹脂板が多数個取り配線基板の導体バンプと反対面に形成された半田接合パッドと接触して傷つけてしまうという問題点を有していた。

【0008】また、従来の切断用押え治具を用いて多数個取り配線基板を切断して得られた配線基板は、配線基板の表面に形成された導体バンプが軟らかいために、切断される際に硬い樹脂板との接触により導体バンプが変形してその高さが低くなってしまい、配線基板の配線導体層と電子部品の各電極とを導体バンプを介して実装す

る際に両者が確実に接合できないという問題点を有していた。さらに、切断時に硬い樹脂板との接触により半田接合パッドが擦れて傷がついてしまい、半田接合パッドと半田との接合強度が弱くなってしまうという問題点を有していた。

【0009】本発明は、かかる従来技術の問題点を鑑み完成されたものであり、その目的は、多数個取り配線基板を切断する際に配線基板上の導体バンプを保護し、電子部品の電極と導体バンプとの接合を確実にでき、また、繰返し使用可能な切断用押え治具およびこれを用いた配線基板の製造方法を提供するものである。

【0010】

【課題を解決するための手段】本発明の多数個取り配線基板切断用押え治具は、主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を両主面から挟む樹脂板から成る第1治具と第2治具とから成り、第1治具は配線基板領域を個々に切断するための切断刃を誘導するスリットを有するとともに第2治具はスリットに対向する位置に溝を有する多数個取り配線基板切断用押え治具であって、導体バンプと対向する第1または第2治具は、その対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することを特徴とするものである。

【0011】また、本発明の多数個取り配線基板切断用押え治具は、上記構成において、導体バンプとの対向面に厚みが0.2~2.0mmである緩衝材を有することを特徴とするものである。

【0012】さらに、本発明の多数個取り配線基板切断用押え治具は、上記構成において、導体バンプとの対向しない面にも硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することを特徴とするものである。

【0013】また、本発明の配線基板の製造方法は、主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を用意する工程と、多数の配線基板領域を個々に切断するための切断刃を誘導するスリットを有する第1治具またはスリットに対向する位置に溝を有する第2治具において、導体バンプとの対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を介在させて、多数個取り配線基板を第1治具および第2治具で挟み固定する工程と、多数の配線基板領域を個々の配線基板に切断する工程とを順次行うことを特徴とするものである。

【0014】本発明の多数個取り配線基板切断用押え治具によれば、多数個取り配線基板の導体バンプと対向する第1または第2治具が、その対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することから、切断用押え治具で多数個取り配線基板を上下から挟みこみ固定したとしても、緩衝材がクッションの役目を果たし、軟らかい導体バンプを変

形させてその高さを低くしてしまうということはない。また、緩衝材の厚みが0.2~2.0mmであることから、緩衝材の厚みが導体バンプの高さよりも十分に厚く、多数個取り配線基板切断用押え治具を強く押えた場合においても使用後に導体バンプのへこみが回復し、治具の表面に導体バンプの跡が残って凹凸が形成されることはなく、その結果、繰返して使用することができる。さらに、多数個取り配線基板の導体バンプと対向しない面にも硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することから、多数個取り配線基板の導体バンプと反対側の面に形成された半田接合パッドにおいても、緩衝材がクッションの役目を果たして、多数個取り配線基板を切断する際に表面を傷つけることはない。

【0015】本発明の配線基板の製造方法によれば、主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を、多数の配線基板領域を個々に切断するための切断刃を誘導するスリットを有する第1治具またはスリットに対向する位置に溝を有する第2治具において、導体バンプとの対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を介在させて、多数個取り配線基板を第1治具および第2治具で挟み固定して切断することから、緩衝材が十分に軟らかく、多数個取り配線基板切断する際に導体バンプを変形させてしまうことはない。そしてその結果、配線基板の配線導体層と電子部品の各電極とを導体バンプを介して実装する際に両者を確実に接合させることができる。また、切断時に樹脂板との接触により半田接合パッドが擦れて半田接合パッドに傷がつき、半田接合パッドと半田との接合強度が弱くなってしまうこともない。

【0016】

【発明の実施の形態】つぎに、本発明の多数個取り配線基板切断用治具を添付の図面に基づいて詳細に説明する。

【0017】図1(a)および(b)は、それぞれ本発明の多数個取り配線基板切断用押え治具の第1治具の上面図および断面図であり、図2(a)および(b)は、それぞれ第2治具の上面図および断面図である。また、図3は、多数の配線基板領域を配列して成る多数個取り配線基板の一例であり、図4は、本発明の多数個取り配線基板切断用押え治具の第1治具と、第2治具と、図3に示した多数個取り配線基板との位置関係を示す断面図である。これらの図において、1は多数個取り配線基板切断用押え治具、2は第1治具、3は第2治具であり、本発明の多数個取り配線基板切断用押え治具1は第1治具2と第2治具3とで構成されている。また、9は多数の配線基板領域8を有する多数個取り配線基板である。

【0018】第1治具2および第2治具3は、多数個取り配線基板9を切断する際にこれを上下方向から押えて

固定するとともに後述するスリット4で切断刃を誘導する機能を有し、樹脂板6と緩衝材7とを間に熱硬化性樹脂を介して貼り合わせるにより形成されている。樹脂板6は、その大きさが切断する多数個取り配線基板9と略同一で厚みが1〜3mmであり、第1治具2と第2治具3とに強度を持たせる機能を有し、例えば、紙繊維にフェノール樹脂を含浸させた基板を積層・硬化することにより形成される。樹脂板6の厚みが1mm未満であると、その強度が低いものとなりそりや変形が出易くなる傾向があり、また、3mmを超えるとルータで切断する際に、切断が困難となる傾向がある。従って、樹脂板6の厚みは1〜3mmの範囲が好ましい。他方、緩衝材7は、切断する多数個取り配線基板9を固定するとともに、配線基板表面に形成された、後述する導体バンプの変形や半田接合パッドへの傷つきを防止する機能を有する。また、緩衝材7の材質は、硬度がJ I S-Aで10〜30であるとともに圧縮永久歪が5%以下であるものが好ましく、発泡ポリウレタン樹脂や発泡ゴム等が用いられる。

【0019】また、第1治具2は配線基板領域8を個々に切断するための切断刃を誘導するスリット4を有し、第2治具はスリット4に対向する位置に溝5を有している。スリット4は、その幅が、ルータの切断刃が回転して多数個取り配線基板9の多数の配線基板領域8を切断することから、切断刃の直径より少し大きい0.5〜2.0mmの範囲であることが好ましく、0.5mm未満であると切断刃が第2治具を削ってしまう危険性があり、2.0mmを超えると切断の際の位置精度が低いものとなってしまいう傾向がある。従って、スリット4の幅は0.5〜2.0mmの範囲であることが好ましい。また、第2治具2の溝5は、その幅がスリット4の幅と同等であり、深さが0.3〜1.0mmの範囲であることが好ましく、溝5の深さが0.3mm未満であると切断刃が第2治具を削ってしまう危険性があり、1.0mmを超えると溝5の深さが深いものとなり、第2治具3の強度が低下してしまう傾向がある。従って、溝5の深さは0.3〜1.0mmの範囲であることが好ましい。

【0020】第1治具2と第2治具3の間には、図3に平面図で示すような主面に導体バンプ10を有する多数個取り配線基板9が載置される。なお、第1治具2、第2治具3および多数個取り配線基板9は、それぞれ対応する位置に径が2〜5mm程度の孔hを有しており、第2治具3の上に多数個取り配線基板9および第1治具2を順に重ねた後、孔hにピンを差し込むことにより、容易に位置合わせをすることができる。また、孔hの位置・数量は、多数個取り配線基板9の大きさ等により決められよい。

【0021】多数個取り配線基板9は、プリント基板やビルドアップ基板等から成る配線基板を多数個配列して成り、例えば、プリント基板から成る多数個取り配線基

板9は、両面に銅めっきや銅箔等から成る配線導体層を有する絶縁板を接着用樹脂を介して複数積層するとともに加熱・加圧して硬化した後、ドリル等で貫通孔を形成し、しかる後、貫通孔内壁に銅めっきを施し配線導体層間を電気的に接続することにより製作される。また、ビルドアップ基板から成る多数個取り配線基板9は、絶縁板両面に絶縁層を積層した後、絶縁層にレーザで貫通孔を形成し、しかる後に絶縁層表面および貫通孔内部に銅めっきで配線導体層を形成し、さらに絶縁層と配線導体層との積層を繰返すことにより製作される。また、多数個取り配線基板9の表面に露出した配線導体層上に半田ペーストを印刷した後、リフロー炉を通して半田ペーストを過熱溶融することにより、半球状で高さが10〜100μm程度の導体バンプ10が形成される。これらの導体バンプ10は配線基板9の配線導体層と電子部品の各電極（図示せず）とを電気的に接続する機能がある。なお、上述の例では、導体バンプ10を半田ペーストを使用して形成した例を示したが、導体バンプ10の材料とし、錫-鉛合金や錫-鉛-アンチモン合金、鉛-亜鉛合金、錫-銀-ビスマス合金等も使用される。また、銅めっきや銅箔から成る配線導体層の露出する表面には、配線導体層の酸化・腐食を防止するとともに導体バンプ10との接合を良好となすために、ニッケルおよび金めっきが施されている。

【0022】一方、配線基板10の導体バンプ8が形成された面の反対側の面には、半田を介して外部電気回路基板（図示せず）の電極と接続するための半田接合パッド（図示せず）が形成されている。

【0023】本発明の多数個取り配線基板切断用押え治具1においては、導体バンプ10と対向する第1または第2治具2・3がその対向面に硬度がJ I S-Aで10〜30であるとともに圧縮永久歪が5%以下である緩衝材7を有することが好ましい。また、このことが重要である。

【0024】本発明の多数個取り配線基板切断用押え治具1によれば、導体バンプ10と対向する第1または第2治具2・3がその対向面に硬度がJ I S-Aで10〜30であるとともに圧縮永久歪が5%以下である緩衝材7を有することから、多数個取り配線基板切断用押え治具1で多数個取り配線基板9を上下から挟みこみ固定したとしても、緩衝材7がクッションの役目を果たし、軟らかい導体バンプ10を変形させてその高さを低くしてしまうということはない。

【0025】さらに、本発明の多数個取り配線基板切断用押え治具1においては、緩衝材7の厚みを0.2〜2.0mmとすることが好ましく、また、このことが重要である。緩衝材7の厚みが0.2〜2.0mmであることから、緩衝材7の厚みが導体バンプ10の高さよりも十分に厚くなり、多数個取り配線基板切断用押え治具1を強く押えた場合においても使用後に緩衝材7表面の導体バンプ10によるへこみが回復し、治具の表面に導体バンプ10の跡が

残って凹凸が形成されることはなく、その結果、繰返し使用することができる。

【0026】なお、ここで硬度は、JIS-K7215に記載されているように、タイプAのデュロメータ針の緩衝材7への侵入深さで表わされる値であり、一方、圧縮永久歪は、JIS-K6401に記載されているように、70℃の温度で50%に圧縮した状態で22時間経過後、荷重を開放して30分後の厚み変化で表わされる。

【0027】緩衝材7の硬度がJIS-Aで10未満であると、緩衝材7が軟らか過ぎてクッション効果が低下する傾向があり、また、30を超えると導体バンプ10に傷をつけたり押し潰してしまう傾向がある。従って、緩衝材7の硬度はJIS-Aで10～30の範囲が好ましい。また、緩衝材7の圧縮永久歪が5%を超えると緩衝材7の復元力が低下し、繰返し使用できなくなる傾向がある。従って、緩衝材7の圧縮永久歪は5%以下が好ましい。さらに、緩衝材7の厚みが0.2mm未満であると導体バンプ10の変形や半田接合パッドへの傷つきが生じ易くなる傾向があり、2mmを超えると多数個取り配線基板9が動き易くなり、正確に切断できなくなる傾向がある。従って、緩衝材7の厚みは0.2～2mmの範囲が好ましい。

【0028】さらに、本発明の多数個取り配線基板切断用押え治具1においては、導体バンプ10との対向しない面にも硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材7を形成することが好ましい。

【0029】本発明の多数個取り配線基板切断用押え治具1によれば、導体バンプ10との対向しない面にも硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材7を形成したことから、多数個取り配線基板9の導体バンプ10と反対側の面に形成された半田接合パッドにおいても、緩衝材7がクッションの役目を果たして、多数個取り配線基板9を切断する際に表面が擦れて傷が付くことはない。

【0030】なお、緩衝材7の硬度がJIS-Aで10未満であると、緩衝材7が軟らか過ぎてクッション効果が低下する傾向があり、また、30を超えると半田接合パッドに傷をつけてしまい易くなる傾向がある。従って、緩衝材7の硬度はJIS-Aで10～30の範囲が好ましい。また、緩衝材7の圧縮永久歪が5%を超えると緩衝材7の復元力が低下し、繰返し使用できなくなる傾向がある。従って、緩衝材7の圧縮永久歪は5%以下が好ましい。

【0031】かくして、本発明の多数個取り配線基板切断用押え治具1によれば、導体バンプ10と対向する第1または第2治具2・3がその対向面に硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材7を有することから、切断用押え治具1で多数個取り配線基板9を上下から挟みこみ固定したとしても、緩

衝材7がクッションの役目を果たし、軟らかい導体バンプ10を変形させてその高さを低くしてしまうということはない。

【0032】なお、多数個取り配線基板9の切断は、次に述べる方法により行なえばよい。まず、一方方向にスリット4が形成された第1の治具2を用いて多数個取り配線基板9にスリット4に沿ってルータで切り込みを入れる。次に、第1の治具2を、上述のスリット4に対して直角方向にスリット4を有する第1の治具2と取り替え、しかる後、スリット4に沿ってルータで切断することにより、多数個取り配線基板9の配線基板領域8が個片の配線基板に分割される。

【0033】つぎに、本発明の配線基板の製造方法を図面に基づき詳細に説明する。図5(a)～(c)は、本発明の配線基板の製造方法を示す工程毎の断面図である。

【0034】まず、図5(a)に断面図で示すように、主面上に導体バンプ10を有する多数の配線基板領域8を配列して成る多数個取り配線基板9を用意する。このような多数個取り配線基板9は、例えば、表面に配線導体層が形成された絶縁板の両面に絶縁層を積層した後、絶縁層にレーザーで貫通孔を形成し、しかる後、絶縁層表面および貫通孔内部に銅めっきで配線導体層を形成し、さらに、絶縁層と配線導体層との積層を繰返し、最後に、主面上に露出した配線導体層に半田ペーストを印刷するとともにリフロー炉を通して半田ペーストを過熱・溶融することにより半球状の導体バンプ10を形成することにより製作される。

【0035】次に、図5(b)に断面図で示すように、多数の配線基板領域8を個々に切断するための切断刃を誘導するスリット4を有する第1治具2またはスリット4に対向する位置に溝5を有する第2治具3において、導体バンプ10との対向面に硬度がJIS-Aで10～30であるとともに圧縮永久歪が5%以下である緩衝材7を介在させて、多数個取り配線基板9を第1治具2および第2治具3で挟み固定する。

【0036】第1治具2および第2治具3は、樹脂板6と緩衝材7とを間に熱硬化性樹脂を介して貼り合わせるにより形成されている。樹脂板6は、その大きさが切断する多数個取り配線基板9と略同一で厚みが1～3mmであり、第1治具2と第2治具3とに強度を持たせる機能を有し、例えば、紙繊維にフェノール樹脂を含浸させた基板を積層・硬化することにより形成される。樹脂板6の厚みが1mm未満であると、その強度が低いものとなりそりや変形が出易くなる傾向があり、また、3mmを超えるとルータで切断する際に、切断が困難となる傾向がある。従って、樹脂板6の厚みは1～3mmの範囲が好ましい。他方、緩衝材7は、切断する多数個取り配線基板9を固定するとともに、多数個取り配線基板9表面に形成された、導体バンプ10の変形や配線導体層

への傷つきを防止する機能を有する。

【0037】また、第1治具2は配線基板領域8を個々に切断して配線基板11とするための切断刃を誘導するスリット4を有し、第2治具はスリット4に対向する位置に溝5を有している。スリット4は、その幅が、ルータの切断刃が回転して多数個取り配線基板9の多数の配線基板領域8を切断することから、切断刃の直径より少し大きい0.5~2.0mmの範囲であることが好ましく、0.5mm未満であると切断刃が第2治具を削ってしまう危険性があり、2.0mmを超えると切断の際の位置精度が低いものになってしまう傾向がある。従って、スリット4の幅は0.5~2.0mmの範囲であることが好ましい。また、第2治具2の溝5は、その幅がスリット4の幅と同等であり、深さが0.3~1.0mmの範囲であることが好ましく、溝5の深さが0.3mm未満であると切断刃が第2治具を削ってしまう危険性があり、1.0mmを超えると溝5の深さが深いものとなり、第2治具3の強度が低下してしまう傾向がある。従って、溝5の深さは0.3~1.0mmの範囲であることが好ましい。

【0038】第1治具2、第2治具3および多数個取り配線基板9は、それぞれ対応する位置の配線基板領域8以外の部分に径が2~5mm程度の孔を有しており、第2治具3の上に多数個取り配線基板9および第1治具2を順に重ねた後、孔にピンを差し込むことにより、容易に位置合わせをすることができる。

【0039】本発明の配線基板8の製造方法によれば、導体バンプ10に対向する第1または第2治具2・3がその対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材7を有することから、多数個取り配線基板切断用押え治具1で多数個取り配線基板9を上下から挟みこみ固定したとしても、緩衝材7がクッションの役目を果たし、軟らかい導体バンプ10を変形させてその高さを低くしてしまうということはない。

【0040】緩衝材7の硬度がJIS-Aで10未満であると、緩衝材7が軟らか過ぎてクッション効果が低下する傾向があり、また、30を超えると導体バンプ10に傷をつけたり押し潰してしまう傾向がある。従って、緩衝材7の硬度はJIS-Aで10~30の範囲が好ましい。また、緩衝材7の圧縮永久歪が5%を超えると緩衝材7の復元力が低下し、繰り返し使用できなくなる傾向がある。従って、緩衝材7の圧縮永久歪は5%以下が好ましい。

【0041】なお、緩衝材7の厚みは、治具の表面に導体バンプ10の跡が残って凹凸が形成されることを防止するためには、0.2~2.0mmの範囲であることが好ましく、緩衝材7の厚みが0.2mm未満であると導体バンプ10の変形や半田接合パッドへの傷つきが生じ易くなる傾向があり、2mmを超えると多数個取り配線基板9が動き易くなり、正確に切断できなくなる傾向がある。従っ

て、緩衝材7の厚みは0.2~2mmの範囲が好ましい。

【0042】さらに、本発明の配線基板11の製造方法においては、多数個取り配線基板切断用押え治具1の導体バンプ10との対向しない面にも硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材7を形成することが好ましい。導体バンプ10との対向しない面にも硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材7を形成することにより、多数個取り配線基板9の導体バンプ10と反対側の面に形成された半田接合パッドにおいても、緩衝材7がクッションの役目を果たして、多数個取り配線基板9を切断する際に表面が擦れて傷が付くことはない。

【0043】なお、緩衝材7の硬度がJIS-Aで10未満であると、緩衝材7が軟らか過ぎてクッション効果が低下する傾向があり、また、30を超えると半田接合パッドに傷をつけてしまい易くなる傾向がある。従って、緩衝材7の硬度はJIS-Aで10~30の範囲が好ましい。また、緩衝材7の圧縮永久歪が5%を超えると緩衝材7の復元力が低下し、繰り返し使用できなくなる傾向がある。従って、緩衝材7の圧縮永久歪は5%以下が好ましい。

【0044】そして最後に、図3(c)に断面図で示すように、多数個取り配線基板9をスリット4に沿ってダイシングやルータ等の切断機を用いて切断することにより個々に分割された配線基板11を得ることができる。なお、多数個取り配線基板9の切断は、まず一方向にスリット4が形成された第1の治具2を用いて多数個取り配線基板9にスリット4に沿ってルータで切り込みを入れる。次に、第1の治具2を、上述のスリット4に対して直角方向にスリット4を有する第1の治具2と取り替え、しかる後、スリット4に沿ってルータで切断することにより、多数個取り配線基板9の配線基板領域8を配線基板に分割することができる。

【0045】かくして、本発明の配線基板11の製造方法によれば、主面上に導体バンプ10を有する多数の配線基板領域8を配列して成る多数個取り配線基板9を、多数の配線基板領域8を個々に切断するための切断刃を誘導するスリット4を有する第1治具2またはスリット4に対向する位置に溝5を有する第2治具3において、導体バンプ8との対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材7を介在させて、多数個取り配線基板9を第1治具2および第2治具3で挟み固定して、多数の配線基板領域8を個々の配線基板11に切断することから、緩衝材7が十分に軟らかく、多数個取り配線基板9を切断する際に導体バンプ10を変形させてしまうことはない。そしてその結果、電子部品の各電極と配線基板11の配線導体層とを導体バンプ10を介して実装する際に両者を確実に接合することができる。また、切断時に治具との接触により配線基板11の半田接合パッドに傷をつけることなく、半田接合パッ

ドと半田との接合強度が弱くなってしまうこともない。

【0046】なお、本発明の配線基板の製造方法は、上述の実施形態の一例に限定されるものでなく、本発明の要旨を逸脱しない範囲であれば、種々の変更・改良を施すことは何ら差し支えない。

【0047】

【発明の効果】本発明の多数個取り配線基板切断用押え治具によれば、多数個取り配線基板の導体バンプと対向する第1または第2治具が、その対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することから、切断用押え治具で多数個取り配線基板を上下から挟みこみ固定したとしても、緩衝材がクッションの役目を果たし、軟らかい導体バンプを変形させてその高さを低くしてしまうということはない。また、緩衝材の厚みが0.2~2.0mmであることから、緩衝材の厚みが導体バンプの高さよりも十分に厚く、多数個取り配線基板切断用押え治具を強く押えた場合においても使用後に導体バンプのへこみが回復し、治具の表面に導体バンプの跡が残って凹凸が形成されることはなく、その結果、繰返して使用することができる。さらに、多数個取り配線基板の導体バンプと対向しない面にも硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を有することから、多数個取り配線基板の導体バンプと反対側の面に形成された半田接合パッドにおいても、緩衝材がクッションの役目を果たして、多数個取り配線基板を切断する際に表面を傷つけることはない。

【0048】本発明の配線基板の製造方法によれば、主面上に導体バンプを有する多数の配線基板領域を配列して成る多数個取り配線基板を、多数の配線基板領域を個々に切断するための切断刃を誘導するスリットを有する第1治具またはスリットに対向する位置に溝を有する第2治具において、導体バンプとの対向面に硬度がJIS-Aで10~30であるとともに圧縮永久歪が5%以下である緩衝材を介在させて、多数個取り配線基板を第1治具

および第2治具で挟み固定して切断することから、緩衝材が十分に軟らかく、多数個取り配線基板切断する際に導体バンプを変形させてしまうことはない。そしてその結果、配線基板の配線導体層と電子部品の各電極とを導体バンプを介して実装する際に両者を確実に接合させることができる。また、切断時に樹脂板との接触により半田接合パッドが擦れて半田接合パッドに傷がつき、半田接合パッドと半田との接合強度が弱くなってしまうこともない。

【図面の簡単な説明】

【図1】(a)および(b)は、それぞれ本発明の多数個取り配線基板切断用押え治具の第1治具の実施の形態の一例の上面図および断面図である。

【図2】(a)および(b)は、それぞれ本発明の多数個取り配線基板切断用押え治具の第2治具の実施の形態の一例の上面図および断面図である。

【図3】主面に導体バンプを有する多数個取り配線基板の一例の平面図である。

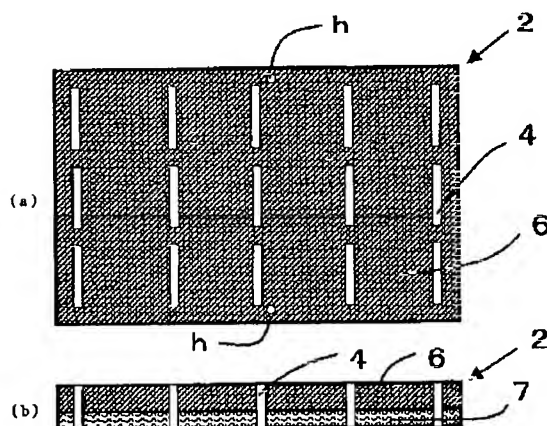
【図4】本発明の多数個取り配線基板切断用押え治具の第1治具と、第2治具と、図3に示した多数個取り配線基板との位置関係を示す断面図である。

【図5】(a)~(c)は、本発明の配線基板の製造方法を説明するための工程毎の断面図である。

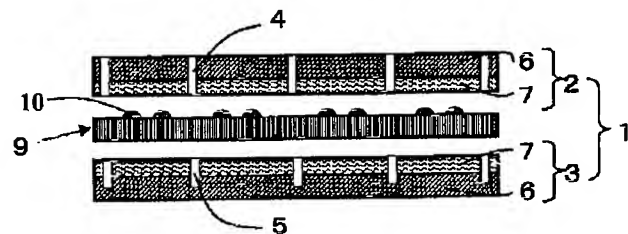
【符号の説明】

- 1 多数個取り配線基板切断用押え治具
- 2 第1治具
- 3 第2治具
- 4 スリット
- 5 溝
- 6 樹脂板
- 7 緩衝材
- 8 配線基板領域
- 9 多数個取り配線基板
- 10 導体バンプ
- 11 配線基板

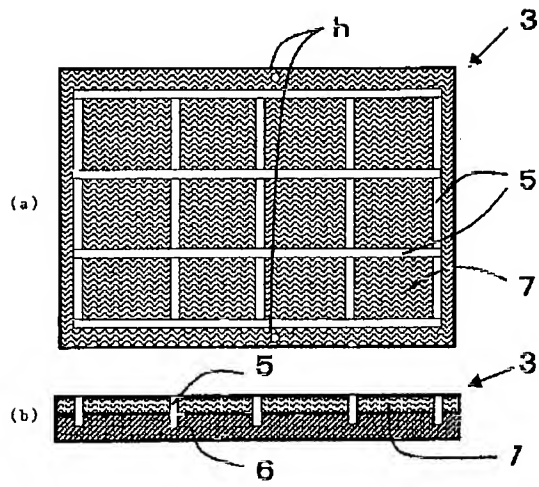
【図1】



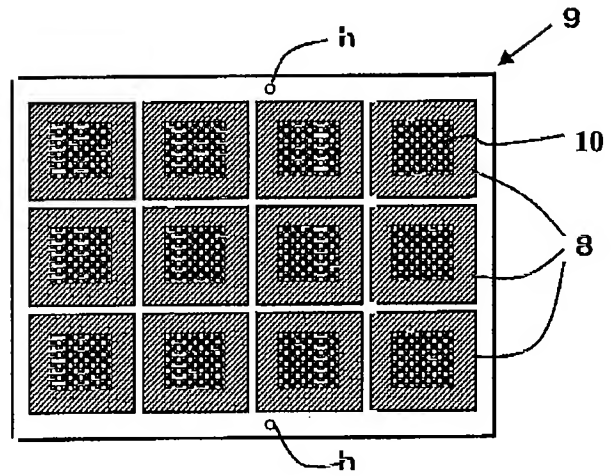
【図4】



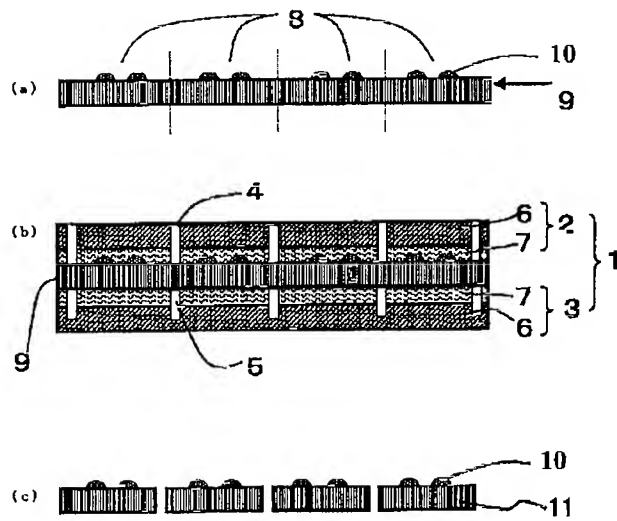
【図2】



【図3】



【図5】



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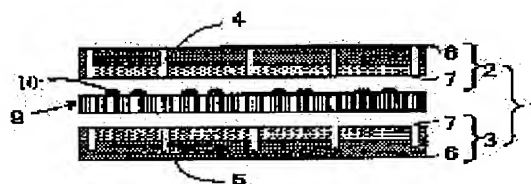
(72)Inventor : FUJIWARA TADASHI

KIRIKIHARA ISAMU

(54) MULTIPLE ALLOCATION WIRING BOARD CUTTING PRESSING JIG AND METHOD OF MANUFACTURING WIRING BOARD BY USE THEREOF THE SAME**(57)Abstract:**

PROBLEM TO BE SOLVED: To prevent conductor bumps formed on the surface of a multiple allocation cutting wiring board from being deformed, to surely bond the conductor bumps to the electrodes of an electronic part when the multiple-cutting board is cut off, and to provide a multiple allocation wiring board cutting pressing jig which can be repeatedly used.

SOLUTION: A multiple-cutting wiring board 9, in which a large number of wiring board regions 8 with conductor bumps 10 are arranged on its main surface, is sandwiched in between a first jig 2 and a second jig 3 which are formed of resin board. A multiple allocation wiring board cutting pressing jig 1 is composed of the first jig 2, provided with slits 4 which guide the cutting edges that cut the wiring board regions 8 separately and the second jig 3 provided with grooves 5, that confront the slits 4. The first jig 2 or the second jig 3, confronting the conductor bumps 10, is equipped with a buffer 7 whose hardness is 10 to 30 in accordance with JIS-A and compressive permanent distortion is 5% or below on its surface opposed to the conductive bumps 10.

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CLAIMS

[Claim(s)]

[Claim 1] It consists of the 1st fixture and the 2nd fixture which consist of the resin plate which arranges the wiring substrate field of a large number which have a bump, and changes, and many whose picking wiring substrates are pinched from both principal planes. a principal plane top -- a conductor -- While said 1st fixture has the slit which guides the cutting cutting edge for cutting said wiring substrate field separately, said 2nd fixture is a presser-foot fixture for many picking wiring substrate cutting which has a slot in the location which counters said slit. said conductor -- it is characterized by said 1st or 2nd fixture which counters with a bump having the shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A in the opposed face -- a large number -- the presser-foot fixture for picking wiring substrate cutting.

[Claim 2] said -- a large number -- the presser-foot fixture for picking wiring substrate cutting -- said conductor -- it is characterized by having the shock absorbing material whose thickness is 0.2-2.0mm in an opposed face with a bump -- being according to claim 1 -- a large number -- the presser-foot fixture for picking wiring substrate cutting.

[Claim 3] said -- a large number -- the presser-foot fixture for picking wiring substrate cutting -- said conductor -- while degrees of hardness are 10-30 in JIS-A, a compression set is characterized by having the shock absorbing material which is 5% or less also in the field with a bump which does not counter -- being according to claim 1 or 2 -- a large number -- the presser-foot fixture for picking wiring substrate cutting.

[Claim 4] a principal plane top -- a conductor -- the wiring substrate field of a large number which have a bump with the process which arranges and changes and which prepares many picking wiring substrates In the 2nd fixture which has a slot in the location which counters the 1st fixture which has the slit which guides the cutting cutting edge for cutting the wiring substrate field of said large number separately, or said slit The shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A is made to be placed between opposed faces with a bump. said conductor -- with said process fixed on both sides of a picking wiring substrate with the 1st fixture and the 2nd fixture [many] The manufacture approach of the wiring substrate characterized by performing the process which cuts the wiring substrate field of said large number to each wiring substrate one by one.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the wiring substrate using the presser-foot fixture for picking wiring substrate cutting, and this in large numbers of having the 1st fixture which has the slit which guides the cutting cutting edge for cutting many wiring substrate fields separately, and the 2nd fixture which has a slot in the location which counters a slit.

[0002]

[Description of the Prior Art] The substrate made of resin, such as a printed circuit board which carries out two or more laminatings of the electric insulating plate which consists of a glass base material and thermosetting resin, and the wiring conductor layer which consists of copper foil etc. to the wiring substrate used since electronic parts, such as a semiconductor device and a resistor, are carried in recent years by turns, and changes, and a build up substrate which carries out two or more laminatings of the insulating layer which consists of thermosetting resin and a filler, and the wiring conductor layer which consists of a copper-plating layer, and changes on an electric insulating plate, has been used. Moreover, such a wiring substrate is formed using the many picking wiring substrate which arranged two or more fields used as a wiring substrate by [this] carrying out the laminating of many electric insulating plates, wiring conductor layers, or insulating layers and wiring conductor layers by turns on a picking wiring substrate, cutting many picking wiring substrates and making it the piece of an individual after an appropriate time. furthermore, the conductor for connecting the electrode of electronic parts, such as a semiconductor device, to a wiring substrate front face -- the bump is formed. a conductor -- after a bump usually prints soldering paste on the front face of the wiring substrate made into the piece of an individual, she is formed in a reflow furnace in the shape of an abbreviation semi-sphere by carrying out heating fusion of the soldering paste through a wiring substrate. in addition, a conductor -- a bump's height is usually about 10-100 micrometers.

[0003] however, the thing for which according to the conventional approach soldering paste is printed for every wiring substrate after cutting many picking wiring substrates and making it the piece of an individual, and it lets a wiring substrate pass at a reflow furnace further -- a conductor -- since the bump was formed, time amount and time and effort were taken and it had the trouble that effectiveness was bad. while printing soldering paste to each wiring substrate field before cutting many picking wiring substrates in order to improve such a trouble -- this -- a reflow furnace -- letting it pass -- a conductor -- a bump is formed and the method of cutting many picking wiring substrates to the piece of an individual, and obtaining a wiring substrate after an appropriate time, is adopted increasingly.

[0004] In addition, a large number are crowded and fixed on both sides of a picking wiring substrate using the presser-foot fixture for cutting which consists of resin plates, such as phenol resin, from the upper and lower sides, and much cutting of a picking wiring substrate is performed after an appropriate time using cutting machines, such as dicing and a router. Moreover, one fixture of the presser-foot fixture for cutting has the slit which guides a cutting cutting edge, and the fixture of another side has the slot in the location which counters a slit.

[0005]

[Problem(s) to be Solved by the Invention] however, the conductor with which such a presser-foot fixture for cutting was formed in the front face of a wiring substrate -- the time of being crowded, fixing and cutting a large number from the upper and lower sides on both sides of a picking wiring substrate, since the bump is soft -- a conductor -- the bump was made to transform and it had the trouble of making the height low. consequently, the wiring conductor layer of a wiring substrate and each electrode of electronic parts -- a conductor -- when mounted through a bump, both had the trouble of being certainly unjoinable.

[0006] moreover -- if the presser-foot fixture for cutting is pressed down too much strongly -- after an activity -- the front face -- a conductor -- a bump's marks will remain and irregularity will be formed, and when it was used repeatedly, it had the trouble of it becoming impossible to fix many picking wiring substrates firmly.

[0007] furthermore -- from [that a resin plate is hard] -- a large number -- the time of cutting of a picking wiring substrate -- a resin plate -- a large number -- the conductor of a picking wiring substrate -- it had the trouble of contacting the soldered joint pad formed in the reverse side with the bump, and damaging.

[0008] Moreover, the wiring substrate which cut many picking wiring substrates and was obtained using the conventional presser-foot fixture for cutting A bump deforms and the height becomes low. the conductor formed in the front face of a wiring substrate -- contact to a resin plate hard [since the bump is soft] in case it is cut -- a conductor -- the wiring conductor layer of a wiring substrate, and each electrode of electronic parts -- a conductor -- when mounted through a bump, both had the trouble of being certainly unjoinable. Furthermore, at the time of cutting, the soldered joint pad was worn by contact to a hard resin plate, the blemish stuck, and it had the trouble that the bonding strength of a soldered joint pad and solder will become weak.

[0009] the time of this invention being completed in view of the trouble of this conventional technique, and a majority of the object cutting a picking wiring substrate -- the conductor on a wiring substrate -- a bump -- protecting -- the electrode of electronic parts, and a conductor -- junction with a bump can be ensured and the manufacture approach of the wiring substrate using the usable presser-foot fixture for cutting and this usable is offered repeatedly.

[0010]

[Means for Solving the Problem] This invention in large numbers the presser-foot fixture for picking wiring substrate cutting It consists of the 1st fixture and the 2nd fixture which consist of the resin plate which arranges the wiring substrate field of a large number which have a bump, and changes, and many whose picking wiring substrates are pinched from both principal planes. a principal plane top -- a conductor -- While the 1st fixture has the slit which guides the cutting cutting edge for cutting a wiring substrate field separately, the 2nd fixture is a presser-foot fixture for many picking wiring substrate cutting which has a slot in the location which counters a slit. a conductor -- the 1st or 2nd fixture which counters with a bump is characterized by having the shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A in the opposed face.

[0011] moreover, this invention -- a large number -- the presser-foot fixture for picking wiring substrate cutting -- the above-mentioned configuration -- setting -- a conductor -- it is characterized by having the shock absorbing material whose thickness is 0.2-2.0mm in an opposed face with a bump.

[0012] furthermore, this invention -- a large number -- the presser-foot fixture for picking wiring substrate cutting -- the above-mentioned configuration -- setting -- a conductor -- while degrees of hardness are 10-30 in JIS-A, a compression set is characterized by having the shock absorbing material which is 5% or less also in the field with a bump which does not counter.

[0013] moreover, the manufacture approach of the wiring substrate of this invention -- a principal plane top -- a conductor -- the wiring substrate field of a large number which have a bump with the process which arranges and changes and which prepares many picking wiring substrates In the 2nd fixture which has a slot in the location which counters the 1st fixture or

slit which has the slit which guides the cutting cutting edge for cutting many wiring substrate fields separately a conductor -- with the process which the shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A is made to be placed between opposed faces with a bump, and are fixed to them on both sides of a picking wiring substrate with the 1st fixture and the 2nd fixture It is characterized by performing the process which cuts many wiring substrate fields to each wiring substrate one by one.

[0014] this invention -- according to the presser-foot fixture for picking wiring substrate cutting in large numbers -- a large number -- the conductor of a picking wiring substrate -- the 1st or 2nd fixture which counters with a bump Since a compression set has the shock absorbing material which is 5% or less in the opposed face while degrees of hardness are 10-30 in JIS-A, even if a large number crowd and fix to it on both sides of a picking wiring substrate from the upper and lower sides with the presser-foot fixture for cutting shock absorbing material -- the duty of a cushion -- achieving -- a soft conductor -- a bump is not made to transform and the height will not necessarily be made low. moreover, the thickness of shock absorbing material since the thickness of shock absorbing material is 0.2-2.0mm -- a conductor -- the case where it was fully thicker than a bump's height, and many presser-foot fixtures for picking wiring substrate cutting are pressed down strongly -- also setting -- after an activity -- a conductor -- a bump's crater -- recovering -- the front face of a fixture -- a conductor -- a bump's marks remain, and irregularity is not formed, consequently it can be used repeatedly. furthermore -- a large number -- the conductor of a picking wiring substrate -- from [having the shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A also in the field which does not counter with a bump] -- a large number -- the conductor of a picking wiring substrate -- in the soldered joint pad formed in the field of an opposite hand with the bump, in case shock absorbing material cuts many picking wiring substrates for the duty of a cushion sure enough, a front face is not damaged

[0015] according to the manufacture approach of the wiring substrate of this invention -- a principal plane top -- a conductor -- the wiring substrate field of a large number which have a bump is arranged, and it changes -- a picking wiring substrate in large numbers In the 2nd fixture which has a slot in the location which counters the 1st fixture or slit which has the slit which guides the cutting cutting edge for cutting many wiring substrate fields separately The shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A is made to be placed between opposed faces with a bump. a conductor -- the time of shock absorbing material being fully soft and carrying out [much] picking wiring substrate cutting, since the 1st fixture and the 2nd fixture fix and cut a large number on both sides of a picking wiring substrate -- a conductor -- a bump is not made to transform and -- consequently, the wiring conductor layer of a wiring substrate and each electrode of electronic parts -- a conductor -- in case it mounts through a bump, both can be joined certainly. Moreover, a soldered joint pad is worn by contact to a resin plate at the time of cutting, a blemish takes lessons from a soldered joint pad, and the bonding strength of a soldered joint pad and solder does not become weak.

[0016]

[Embodiment of the Invention] Below, the fixture for many picking wiring substrate cutting of this invention is explained at a detail based on an attached drawing.

[0017] Much this inventions are the plans and sectional views of the 1st fixture of the presser-foot fixture for picking wiring substrate cutting, respectively, and drawing 2 (a) and (b of drawing 1 (a) and (b)) are the plans and sectional views of the 2nd fixture, respectively. Moreover, drawing 3 is an example of the many picking wiring substrate which arranges many wiring substrate fields and changes, and drawing 4 is the sectional view of this invention which were indicated to be the 1st fixture of the presser-foot fixture for picking wiring substrate cutting, and the 2nd fixture to drawing 3 and in which showing much physical relationship with a picking wiring substrate. In these drawings, as for the presser-foot fixture for picking wiring substrate cutting, and 2, much 1 is [the 1st fixture and 3] the 2nd fixture, and the presser-foot fixture 1 for many picking wiring substrate cutting of this invention consists of the 1st fixture 2 and the 2nd fixture 3. Moreover, 9 is a many picking wiring substrate which has many wiring substrate fields 8.

[0018] The 1st fixture 2 and the 2nd fixture 3 have the function to guide a cutting cutting edge to the slit 4 later mentioned while pressing this down from the upper and lower sides and fixing, in case many picking wiring substrates 9 are cut, and are formed by sticking the resin plate 6 and shock absorbing material 7 through thermosetting resin in between. The resin plate 6 is formed a laminating and by hardening in the substrate which it has [substrate] the function which the magnitude cuts for much thickness to be 1–3mm in the picking wiring substrate 9 and abbreviation identitas, and to give reinforcement to the 1st fixture 2 and the 2nd fixture 3, for example, carried out impregnation of the phenol resin to paper fiber. If the thickness of the resin plate 6 becomes being less than 1mm with a thing with the low reinforcement, and there is an inclination out of which camber and deformation become easy to come and it exceeds 3mm, in case a router will cut, there is an inclination for cutting to become difficult. Therefore, the thickness of the resin plate 6 has the desirable range of 1–3mm. on the other hand, the conductor which cuts shock absorbing material 7, which was formed in the wiring substrate front face while fixing many picking wiring substrates 9 and which is mentioned later -- it has the function to prevent with [to deformation of a bump or a soldered joint pad] a blemish. Moreover, the construction material of shock absorbing material 7 has that desirable whose compression set is 5% or less while degrees of hardness are 10–30 in JIS-A, and foaming polyurethane resin, foamed rubber, etc. are used.

[0019] Moreover, the 1st fixture 2 has the slit 4 which guides the cutting cutting edge for cutting the wiring substrate field 8 separately, and the 2nd fixture has the slot 5 in the location which counters a slit 4. When a slit 4 has the danger that a cutting cutting edge will shave the 2nd fixture as it is desirable that it is the range of 0.5–2.0mm where it is somewhat larger since the cutting cutting edge of a router rotates and the width of face cuts a majority of many wiring substrate fields 8 of the picking wiring substrate 9 than the diameter of a cutting cutting edge and it is less than 0.5mm and it exceeds 2.0mm, it has the inclination for the location precision in the case of cutting to become low. Therefore, as for the width of face of a slit 4, it is desirable that it is the range of 0.5–2.0mm. Moreover, if there is a danger that a cutting cutting edge will shave the 2nd fixture as the width of face is equivalent to the width of face of a slit 4, it is desirable that it is the range whose depth is 0.3–1.0mm and the depth of a slot 5 is less than 0.3mm and it exceeds 1.0mm, the depth of a slot 5 will become deep, and the slot 5 of the 2nd fixture 2 has the inclination for the reinforcement of the 2nd fixture 3 to fall. Therefore, as for the depth of a slot 5, it is desirable that it is the range of 0.3–1.0mm.

[0020] a principal plane as shown with a top view between the 1st fixture 2 and the 2nd fixture 3 at drawing 3 -- a conductor -- it has a bump 10 -- many picking wiring substrates 9 are laid. in addition, the hole many whose paths are about 2–5mm in the 1st fixture 2, the 2nd fixture 3, and the location where the picking wiring substrate 9 corresponds, respectively -- it has h, and after piling up many picking wiring substrate 9 and 1st fixture 2 in order on the 2nd fixture 3, alignment can be easily carried out by inserting a pin in Hole h. Moreover, what is necessary is just to decide much locations and quantity which is Hole h with the magnitude of the picking wiring substrate 9 etc.

[0021] The many picking wiring substrate 9 which the picking wiring substrate 9 arranges many wiring substrates which consist of a printed circuit board, a build up substrate, etc., and changes, for example, consists of a printed circuit board in large numbers While carrying out two or more laminatings of the electric insulating plate which has the wiring conductor layer which changes from copper plating, copper foil, etc. to both sides through the resin for adhesion, after heating and pressurizing and hardening, a breakthrough is formed with a drill etc. and it is manufactured by giving copper plating to a breakthrough wall and connecting between wiring conductor layers to it electrically after an appropriate time. Moreover, after [which consists of a build up substrate] carrying out the laminating of the insulating layer to electric insulating plate both sides, the picking wiring substrate 9 forms a breakthrough in an insulating layer by laser, forms a wiring conductor layer in the interior of an insulating-layer front face and a breakthrough by copper plating after an appropriate time, and are manufactured by repeating the laminating of an insulating layer and a wiring conductor layer further. [many] moreover, the conductor whose height it is hemispherical and is about 10–100 micrometers by carrying out overheating fusion of

the soldering paste through a reflow furnace after printing soldering paste on the wiring conductor layer exposed to the front face of the picking wiring substrate 9 -- a bump 10 is formed. [many] these conductors -- a bump 10 has the function to connect electrically the wiring conductor layer of the wiring substrate 9, and each electrode (not shown) of electronic parts. in addition -- an above-mentioned example -- a conductor -- although the example which formed the bump 10 using soldering paste was shown -- a conductor -- it considers as a bump's 10 ingredient and a tin lead alloy, a tin-lead-regulus metal, a lead-zinc alloy, a tin-silver-bismuth alloy, etc. are used. moreover -- while preventing oxidization and corrosion of a wiring conductor layer in the front face which the wiring conductor layer which consists of copper plating or copper foil exposes -- a conductor -- in order to join a bump 10 to fitness, nickel and gilding are given.

[0022] on the other hand -- the conductor of the wiring substrate 10 -- the soldered joint pad (not shown) for connecting with the electrode of an external electrical circuit substrate (not shown) through solder is formed in the field of the opposite hand of the field in which the bump 8 was formed.

[0023] this invention -- a large number -- the presser-foot fixture 1 for picking wiring substrate cutting -- setting -- a conductor -- it is desirable that the 1st or 2nd fixture 2-3 which counters with a bump 10 has the shock absorbing material 7 whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A at the opposed face. Moreover, this is important.

[0024] this invention -- according to the presser-foot fixture 1 for picking wiring substrate cutting in large numbers -- a conductor -- while degrees of hardness are 10-30 in JIS-A at the opposed face, the 1st or 2nd fixture 2-3 which counters with a bump 10 from having the shock absorbing material 7 whose compression set is 5% or less ***** much large number are crowded and fixed on both sides of the picking wiring substrate 9 from the upper and lower sides with the presser-foot fixture 1 for picking wiring substrate cutting -- shock absorbing material 7 -- the duty of a cushion -- achieving -- a soft conductor -- a bump 10 is not made to transform and the height will not necessarily be made low.

[0025] Furthermore, in the presser-foot fixture 1 for picking wiring substrate cutting, the thing of this invention for which thickness of shock absorbing material 7 is set to 0.2-2.0mm is desirable in large numbers, and this is important. It becomes thicker enough than a bump's 10 height. the thickness of shock absorbing material 7 since the thickness of shock absorbing material 7 is 0.2-2.0mm -- a conductor -- the case where many presser-foot fixtures 1 for picking wiring substrate cutting are pressed down strongly -- also setting -- after an activity -- the conductor of shock absorbing material 7 front face -- the crater by the bump 10 -- recovering -- the front face of a fixture -- a conductor -- a bump's 10 marks remain, and irregularity is not formed, consequently it can be used repeatedly.

[0026] In addition, a degree of hardness is a value expressed with the trespass depth to the shock absorbing material 7 of the durometer needle of Type A as indicated by JIS-K7215 here, and on the other hand, a compression set is expressed with the thickness change 30 minutes after opening a load after 22-hour progress in the condition of having compressed to 50% at the temperature of 70 degrees C as indicated by JIS-K6401.

[0027] if there is an inclination for shock absorbing material 7 to be too soft in the degree of hardness of shock absorbing material 7 being less than ten in JIS-A, and for cushion effect to fall and 30 is exceeded -- a conductor -- there is an inclination which gives a blemish to a bump 10 or is crushed. Therefore, the degree of hardness of shock absorbing material 7 has the desirable range of 10-30 at JIS-A. Moreover, when the compression set of shock absorbing material 7 exceeds 5%, there is an inclination it becomes impossible for the stability of shock absorbing material 7 to decline and use repeatedly. Therefore, 5% or less of the compression set of shock absorbing material 7 is desirable. furthermore -- the thickness of shock absorbing material 7 is less than 0.2mm -- a conductor -- if there is an inclination which becomes easy to produce with [to deformation of a bump 10 or a soldered joint pad] a blemish and it exceeds 2mm -- a large number -- the picking wiring substrate 9 -- moving -- being easy -- there is an inclination it becomes impossible to cut to accuracy. Therefore, the thickness of shock absorbing

material 7 has the desirable range of 0.2–2mm.

[0028] furthermore, this invention — a large number — the presser-foot fixture 1 for picking wiring substrate cutting — setting — a conductor — it is desirable to form the shock absorbing material 7 whose compression set is 5% or less while degrees of hardness are 10–30 in JIS-A also in the field with a bump 10 which does not counter.

[0029] this invention — according to the presser-foot fixture 1 for picking wiring substrate cutting in large numbers — a conductor — from having formed the shock absorbing material 7 whose compression set is 5% or less also in the field with a bump 10 which does not counter, while degrees of hardness were 10–30 in JIS-A a large number — the conductor of the picking wiring substrate 9 — in the soldered joint pad formed in the field of an opposite hand with the bump 10, in case shock absorbing material 7 cuts many picking wiring substrates 9 for the duty of a cushion sure enough, a front face is worn and a blemish is not attached

[0030] In addition, when there is an inclination for shock absorbing material 7 to be too soft in the degree of hardness of shock absorbing material 7 being less than ten in JIS-A, and for cushion effect to fall and 30 is exceeded, there is an inclination to become easy to give a blemish to a soldered joint pad. Therefore, the degree of hardness of shock absorbing material 7 has the desirable range of 10–30 at JIS-A. Moreover, when the compression set of shock absorbing material 7 exceeds 5%, there is an inclination it becomes impossible for the stability of shock absorbing material 7 to decline and use repeatedly. Therefore, 5% or less of the compression set of shock absorbing material 7 is desirable.

[0031] According to the presser-foot fixture 1 for many picking wiring substrate cutting of this invention, in this way a conductor — while degrees of hardness are 10–30 in JIS-A at the opposed face, the 1st or 2nd fixture 2–3 which counters with a bump 10 from having the shock absorbing material 7 whose compression set is 5% or less ***** a large number are crowded and fixed on both sides of the picking wiring substrate 9 from the upper and lower sides with the presser-foot fixture 1 for cutting — shock absorbing material 7 — the duty of a cushion — achieving — a soft conductor — a bump 10 is not made to transform and the height will not necessarily be made low.

[0032] In addition, what is necessary is just to perform much cutting of the picking wiring substrate 9 by the approach described below. First, along with a slit 4, much slitting is put into the picking wiring substrate 9 with a router using the 1st fixture 2 with which the slit 4 was formed in the one direction. Next, many wiring substrate fields 8 of the picking wiring substrate 9 are divided into the wiring substrate of the piece of an individual by replacing the 1st fixture 2 with the 1st fixture 2 which has a slit 4 in the direction of a right angle to the above-mentioned slit 4, and cutting it with a router along with a slit 4 after an appropriate time.

[0033] Below, the manufacture approach of the wiring substrate of this invention is explained to a detail based on a drawing. Drawing 5 (a) – (c) is the sectional view for every process showing the manufacture approach of the wiring substrate of this invention.

[0034] first, a sectional view shows to drawing 5 (a) — as — a principal plane top — a conductor — the wiring substrate field 8 of a large number which have a bump 10 is arranged, and it changes — many picking wiring substrates 9 are prepared. After carrying out the laminating of the insulating layer to such both sides of the electric insulating plate with which, as for the picking wiring substrate 9, many wiring conductor layers were formed in the front face, Form a breakthrough in an insulating layer by laser, and a wiring conductor layer is formed in the interior of an insulating-layer front face and a breakthrough by copper plating after an appropriate time. furthermore, the thing for which the laminating of an insulating layer and a wiring conductor layer is repeated, it lets a reflow furnace pass while printing soldering paste finally to the wiring conductor layer exposed on the principal plane, and soldering paste is overheated and fused — a semi-sphere-like conductor — it is manufactured by forming a bump 10.

[0035] Next, it sets to the 2nd fixture 3 which has a slot 5 in the location which counters the 1st fixture 2 or slit 4 which has the slit 4 which guides the cutting cutting edge for cutting many wiring substrate fields 8 separately to drawing 5 (b) as shown in a sectional view. a conductor — while degrees of hardness are 10–30 in JIS-A, a compression set makes the shock absorbing

material 7 which is 5% or less placed between opposed faces with a bump 10, and fix to them on both sides of the picking wiring substrate 9 with the 1st fixture 2 and the 2nd fixture 3. [many] [0036] The 1st fixture 2 and the 2nd fixture 3 are formed by sticking the resin plate 6 and shock absorbing material 7 through thermosetting resin in between. The resin plate 6 is formed a laminating and by hardening in the substrate which it has [substrate] the function which the magnitude cuts for much thickness to be 1-3mm in the picking wiring substrate 9 and abbreviation identitas, and to give reinforcement to the 1st fixture 2 and the 2nd fixture 3, for example, carried out impregnation of the phenol resin to paper fiber. If the thickness of the resin plate 6 becomes being less than 1mm with a thing with the low reinforcement, and there is an inclination out of which camber and deformation become easy to come and it exceeds 3mm, in case a router will cut, there is an inclination for cutting to become difficult. Therefore, the thickness of the resin plate 6 has the desirable range of 1-3mm. on the other hand, the conductor which cuts shock absorbing material 7 and which were formed in picking wiring substrate 9 front face while fixing many picking wiring substrates 9 -- it has the function to prevent with [to deformation of a bump 10 or a wiring conductor layer] a blemish.

[0037] Moreover, the 1st fixture 2 has the slit 4 which guides the cutting cutting edge for cutting the wiring substrate field 8 separately and considering as the wiring substrate 11, and the 2nd fixture has the slot 5 in the location which counters a slit 4. When a slit 4 has the danger that a cutting cutting edge will shave the 2nd fixture as it is desirable that it is the range of 0.5-2.0mm where it is somewhat larger since the cutting cutting edge of a router rotates and the width of face cuts a majority of many wiring substrate fields 8 of the picking wiring substrate 9 than the diameter of a cutting cutting edge and it is less than 0.5mm and it exceeds 2.0mm, it has the inclination for the location precision in the case of cutting to become low. Therefore, as for the width of face of a slit 4, it is desirable that it is the range of 0.5-2.0mm. Moreover, if there is a danger that a cutting cutting edge will shave the 2nd fixture as the width of face is equivalent to the width of face of a slit 4, it is desirable that it is the range whose depth is 0.3-1.0mm and the depth of a slot 5 is less than 0.3mm and it exceeds 1.0mm, the depth of a slot 5 will become deep, and the slot 5 of the 2nd fixture 2 has the inclination for the reinforcement of the 2nd fixture 3 to fall. Therefore, as for the depth of a slot 5, it is desirable that it is the range of 0.3-1.0mm.

[0038] Alignment can be easily carried out by inserting a pin in a hole, after the path's having the hole which is about 2-5mm into parts the 1st fixture 2, the 2nd fixture 3, and other than wiring substrate field 8 of the location where many picking wiring substrates 9 correspond, respectively and piling up many picking wiring substrate 9 and 1st fixture 2 in order on the 2nd fixture 3.

[0039] according to the manufacture approach of the wiring substrate 8 of this invention -- a conductor -- while degrees of hardness are 10-30 in JIS-A at the opposed face, the 1st or 2nd fixture 2-3 which counters with a bump 10 from having the shock absorbing material 7 whose compression set is 5% or less ***** much large number are crowded and fixed on both sides of the picking wiring substrate 9 from the upper and lower sides with the presser-foot fixture 1 for picking wiring substrate cutting -- shock absorbing material 7 -- the duty of a cushion -- achieving -- a soft conductor -- a bump 10 is not made to transform and the height will not necessarily be made low.

[0040] if there is an inclination for shock absorbing material 7 to be too soft in the degree of hardness of shock absorbing material 7 being less than ten in JIS-A, and for cushion effect to fall and 30 is exceeded -- a conductor -- there is an inclination which gives a blemish to a bump 10 or is crushed. Therefore, the degree of hardness of shock absorbing material 7 has the desirable range of 10-30 at JIS-A. Moreover, when the compression set of shock absorbing material 7 exceeds 5%, there is an inclination it becomes impossible for the stability of shock absorbing material 7 to decline and use repeatedly. Therefore, 5% or less of the compression set of shock absorbing material 7 is desirable.

[0041] in addition, the thickness of shock absorbing material 7 -- the front face of a fixture -- a conductor -- in order to prevent that a bump's 10 marks remain and irregularity is formed, it is desirable that it is the range of 0.2-2.0mm, and the thickness of shock absorbing material 7 is less than 0.2mm -- a conductor -- if there is an inclination which becomes easy to produce with

[to deformation of a bump 10 or a soldered joint pad] a blemish and it exceeds 2mm -- a large number -- the picking wiring substrate 9 -- moving -- being easy -- there is an inclination it becomes impossible to cut to accuracy. Therefore, the thickness of shock absorbing material 7 has the desirable range of 0.2-2mm.

[0042] furthermore, the manufacture approach of the wiring substrate 11 of this invention -- setting -- a large number -- the conductor of the presser-foot fixture 1 for picking wiring substrate cutting -- it is desirable to form the shock absorbing material 7 whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A also in the field with a bump 10 which does not counter. a conductor -- forming the shock absorbing material 7 whose compression set is 5% or less also in the field with a bump 10 which does not counter, while degrees of hardness are 10-30 in JIS-A -- a large number -- the conductor of the picking wiring substrate 9 -- in the soldered joint pad formed in the field of an opposite hand with the bump 10, in case shock absorbing material 7 cuts many picking wiring substrates 9 for the duty of a cushion sure enough, a front face is worn and a blemish is not attached

[0043] In addition, when there is an inclination for shock absorbing material 7 to be too soft in the degree of hardness of shock absorbing material 7 being less than ten in JIS-A, and for cushion effect to fall and 30 is exceeded, there is an inclination to become easy to give a blemish to a soldered joint pad. Therefore, the degree of hardness of shock absorbing material 7 has the desirable range of 10-30 at JIS-A. Moreover, when the compression set of shock absorbing material 7 exceeds 5%, there is an inclination it becomes impossible for the stability of shock absorbing material 7 to decline and use repeatedly. Therefore, 5% or less of the compression set of shock absorbing material 7 is desirable.

[0044] And finally, as shown to drawing 3 (c) in a sectional view, the wiring substrate 11 divided separately can be obtained by cutting many picking wiring substrates 9 using cutting machines, such as dicing and a router, along with a slit 4. In addition, cutting of the picking wiring substrate 9 puts much slitting [a majority of] into the picking wiring substrate 9 with a router along with a slit 4 using the 1st fixture 2 with which the slit 4 was first formed in the one direction. Next, many wiring substrate fields 8 of the picking wiring substrate 9 can be divided into a wiring substrate by replacing the 1st fixture 2 with the 1st fixture 2 which has a slit 4 in the direction of a right angle to the above-mentioned slit 4, and cutting it with a router along with a slit 4 after an appropriate time.

[0045] according to the manufacture approach of the wiring substrate 11 of this invention in this way -- a principal plane top -- a conductor -- the wiring substrate field 8 of a large number which have a bump 10 is arranged, and it changes -- the picking wiring substrate 9 in large numbers In the 2nd fixture 3 which has a slot 5 in the location which counters the 1st fixture 2 or slit 4 which has the slit 4 which guides the cutting cutting edge for cutting many wiring substrate fields 8 separately While degrees of hardness are 10-30 in JIS-A, make the shock absorbing material 7 whose compression set is 5% or less placed between opposed faces with a bump 8, and a large number are fixed on both sides of the picking wiring substrate 9 with the 1st fixture 2 and the 2nd fixture 3. a conductor -- the time of shock absorbing material 7 being fully soft, and cutting many picking wiring substrates 9, since many wiring substrate fields 8 are cut to each wiring substrate 11 -- a conductor -- a bump 10 is not made to transform and -- consequently, each electrode of electronic parts and the wiring conductor layer of the wiring substrate 11 -- a conductor -- in case it mounts through a bump 10, both can be joined certainly. Moreover, a blemish is not given to the soldered joint pad of the wiring substrate 11 by contact to a fixture at the time of cutting, and the bonding strength of a soldered joint pad and solder does not become weak.

[0046] In addition, if the manufacture approach of the wiring substrate of this invention is range which is not limited to an example of an above-mentioned operation gestalt, and does not deviate from the summary of this invention, performing various modification and amelioration will not interfere at all.

[0047]

[Effect of the Invention] this invention -- according to the presser-foot fixture for picking wiring substrate cutting in large numbers -- a large number -- the conductor of a picking wiring

substrate -- the 1st or 2nd fixture which counters with a bump Since a compression set has the shock absorbing material which is 5% or less in the opposed face while degrees of hardness are 10-30 in JIS-A, even if a large number crowd and fix to it on both sides of a picking wiring substrate from the upper and lower sides with the presser-foot fixture for cutting shock absorbing material -- the duty of a cushion -- achieving -- a soft conductor -- a bump is not made to transform and the height will not necessarily be made low. moreover, the thickness of shock absorbing material since the thickness of shock absorbing material is 0.2-2.0mm -- a conductor -- the case where it was fully thicker than a bump's height, and many presser-foot fixtures for picking wiring substrate cutting are pressed down strongly -- also setting -- after an activity -- a conductor -- a bump's crater -- recovering -- the front face of a fixture -- a conductor -- a bump's marks remain, and irregularity is not formed, consequently it can be used repeatedly. furthermore -- a large number -- the conductor of a picking wiring substrate -- from [having the shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A also in the field which does not counter with a bump] -- a large number -- the conductor of a picking wiring substrate -- in the soldered joint pad formed in the field of an opposite hand with the bump, in case shock absorbing material cuts many picking wiring substrates for the duty of a cushion sure enough, a front face is not damaged [0048] according to the manufacture approach of the wiring substrate of this invention -- a principal plane top -- a conductor -- the wiring substrate field of a large number which have a bump is arranged, and it changes -- a picking wiring substrate in large numbers In the 2nd fixture which has a slot in the location which counters the 1st fixture or slit which has the slit which guides the cutting cutting edge for cutting many wiring substrate fields separately The shock absorbing material whose compression set is 5% or less while degrees of hardness are 10-30 in JIS-A is made to be placed between opposed faces with a bump. a conductor -- the time of shock absorbing material being fully soft and carrying out [much] picking wiring substrate cutting, since the 1st fixture and the 2nd fixture fix and cut a large number on both sides of a picking wiring substrate -- a conductor -- a bump is not made to transform and -- consequently, the wiring conductor layer of a wiring substrate and each electrode of electronic parts -- a conductor -- in case it mounts through a bump, both can be joined certainly. Moreover, a soldered joint pad is worn by contact to a resin plate at the time of cutting, a blemish takes lessons from a soldered joint pad, and the bonding strength of a soldered joint pad and solder does not become weak.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (a) And (b) is the plan and sectional view of an example of operation of the 1st fixture of a gestalt, respectively. [of this invention] [of the presser-foot fixture for many picking wiring substrate cutting]

[Drawing 2] (a) And (b) is the plan and sectional view of an example of operation of the 2nd fixture of a gestalt, respectively. [of this invention] [of the presser-foot fixture for many picking wiring substrate cutting]

[Drawing 3] a principal plane -- a conductor -- it has a bump -- a large number are the top views of an example of a picking wiring substrate.

[Drawing 4] It is the sectional view of this invention which were indicated to be the 1st fixture of the presser-foot fixture for picking wiring substrate cutting, and the 2nd fixture to drawing 3 and in which showing much physical relationship with a picking wiring substrate.

[Drawing 5] (a) - (c) is a sectional view for every process for explaining the manufacture approach of the wiring substrate of this invention.

[Description of Notations]

1 It is a presser-foot fixture for picking wiring substrate cutting in large numbers.

2 The 1st fixture

3 The 2nd fixture

4 Slit

5 Slot

6 Resin plate

7 Shock absorbing material

8 Wiring substrate field

9 It is a picking wiring substrate in large numbers.

10 a conductor -- a bump

11 Wiring substrate

[Translation done.]

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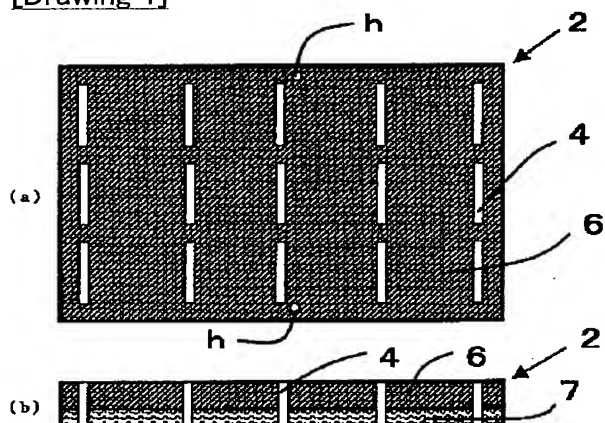
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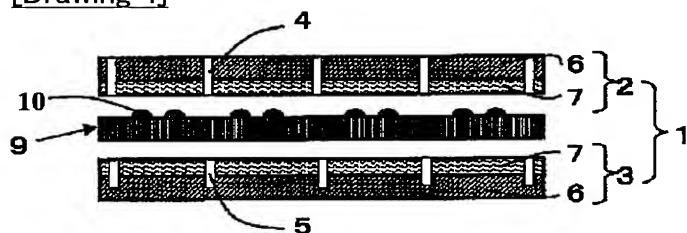
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DRAWINGS

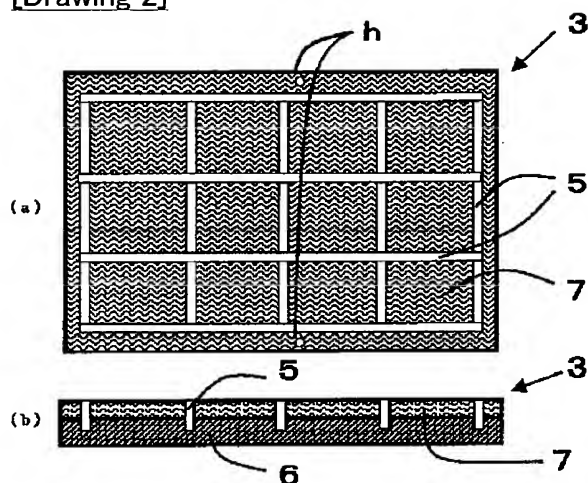
[Drawing 1]



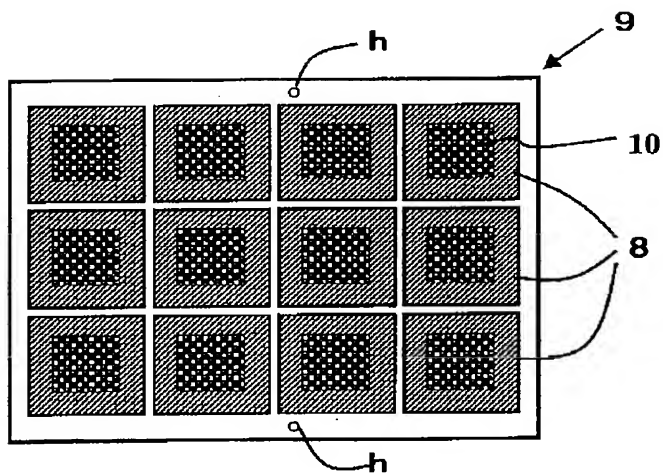
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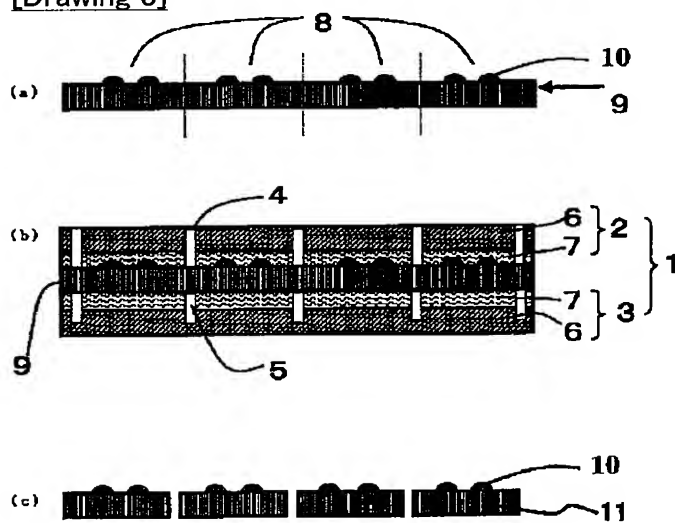
[Drawing 2]



[Drawing 3]



[Drawing 5]



[Translation done.]